Synthesis of lithium titanate (li4Ti5O12) through hydrothermal process by using lithium hydroxide (lioh) and titanium dioxide (Tio2) xerogel

Bambang Priyono, author

Abstrak

Lithium Titanate (Li4Ti5O12) or (LTO) has a potential as an anode material for a high performance lithium ion battery. In this work, LTO was synthesized by a hydrothermal method using Titanium Dioxide (TiO2) xerogel prepared by a sol-gel method and Lithium Hydroxide (LiOH). The sol-gel process was used to synthesize TiO2 xerogel from a titanium tetra-n-butoxide/Ti(OC4H9)4 precursor. An anatase polymorph was obtained by calcining the TiO2 xerogel at a low temperature, i.e.: 300oC and then the hydrothermal reaction was undertaken with 5M LiOH aqueous solution in a hydrothermal process at 135oC for 15 hours to form Li4Ti5O12. The sintering process was conducted at a temperature range varying from 550oC, 650oC, and 750oC, respectively to determine the optimum characteristics of Li4Ti5O12. The characterization was based on Scanning Thermal Analysis (STA), X-ray Powder Diffraction (XRD), Field Emission Scanning Electron Microscopy (FESEM), Fourier Transform Infrared spectroscopy (FTIR), and Brunauer-Emmett-Teller (BET) testing results. The highest intensity of XRD peaks and FTIR spectra of the LTO were found at the highest sintering temperature (750oC). As a trade-off, however, the obtained LTO/Li4Ti5O12 possesses the smallest BET surface area (< 0.001 m2/g) with the highest crystallite size (56.45 nm).